

ABSTRACT

This invention relates to thermo-chemical remediation and decontamination of sediments and soils contaminated with organic contaminants as well as inorganic materials with subsequent beneficial reuse. In the process, novel environmentally stable products of commercial value are produced when certain additives such as calcium and metal oxides are mixed with the contaminated materials. The mixture is fed to a melter and heated to 1150°C ~ 1500°C to produce a molten reaction product. Oxygen or air is continuously bubbled through the melt to provide mixing and achieve high thermal destruction and removal efficiencies of the organic contaminants. The melt is quickly quenched in moist air, steam, or water to avoid the transformation of the amorphous material into crystals. Inorganic contaminants such as chromium, nickel, zinc, etc. are incorporated and completely immobilized within the amorphous silicate network. The amorphous material is pulverized to yield a powder which evinces cementitious properties either by reaction with alkali solution or by blending it with other materials to produce blended cements. The compressive strengths of concretes made from the powder of the subject invention and blends thereof are comparable to, or greater than the ASTM requirements for general purpose concrete applications. The powder, blended cements, and concrete/mortar derived therefrom also easily pass the EPA TCLP leach test to achieve environmental acceptability. Atmospheric emissions resulting from this process are nontoxic and capable of meeting currently specified health and environmental requirements.